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Seminar über Fragen der Mechanik

zu folgendem Vortrag wird herzlich eingeladen

Montag, **25.01.2010, 14:00 Uhr**, Egerlandstr. 5, Raum 0.044

Introduction to Topology Optimization by the SIMP Method

M. Sc. Dipl.-Ing. (FH) Fabian Wein

Lehrstuhl für Angewandte Mathematik II, FAU Erlangen-Nürnberg

Topology optimization by the SIMP (Solid Isotropic Material with Penalization) method is a very efficient structural optimization approach based on the finite element method. Developed by Bendsoe and Kikuchi in the late 1980s it is now subject to research by a lively research community (with significant contributions by Sigmund) and applied to a broad range of applications and physical models. It is also the method implemented for performing topology optimization in the commercial tools OptiStruct, MSC/Nastran, Ansys, Tosca, ...

The principle idea is an ersatz material approach where a so called pseudo density parameter is applied to each cell of the finite element mesh. By varying the parameters arbitrary structures can be modeled on a fixed finite element discretization. The SIMP method is very efficient in solving the resulting optimization problems which typically comprise thousands of design variables.

The main part of the talk will give a basic yet solid introduction to the method, its principles and common obstacles. For reasons of simplicity the introduction is limited to the classical linear elasticity problems stiffness maximization (static and dynamic) and mechanism design (force inverter).

In a second part the talk covers the application of the SIMP method to design piezo-electric transducers, mainly loudspeakers, based on fully coupled multiphysics formulations.